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NATIONAL DAM INSPECTION PROGRAM. DOVERSPIKE NUMBER 2 DAM (NDI I--ETC(U)
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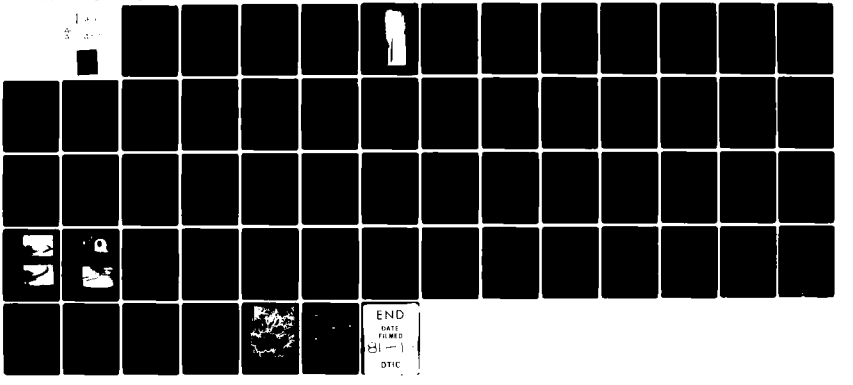

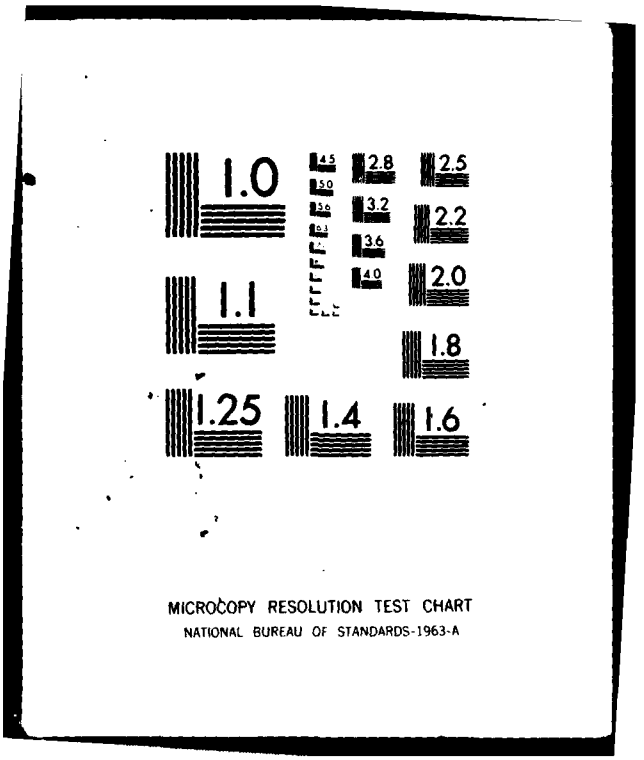
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OHIO RIVER BASIN
CAYLOR RUN, JEFFERSON COUNTY

PENNSYLVANIA

(6) National Dam Inspection Program.

DOVERSPIKE NO. 2 DAM

(Number)

NDI I.D. PA-00810
DER I.D. 33-57, Ohio River Basin,
Caylor Run, Jefferson County,
Pennsylvania.

PHASE I INSPECTION REPORT,
NATIONAL DAM INSPECTION PROGRAM

(15) DACW31-80-C-0022

(11) 1984

(12) 64

(10) Lawrence D. Anderson

PREPARED FOR

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
BALTIMORE, MARYLAND 21203

BY

D'APPOLONIA CONSULTING ENGINEERS
10 DUFF ROAD
PITTSBURGH, PA. 15235

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411001

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Department of the Army, Office of Chief of Engineers, Washington, D.C. 20314.

The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon visual observations and review of available data. Detailed investigations and analyses involving topographic mapping, subsurface investigations, material testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the inspection is intended to identify any need for such studies which should be performed by the owner.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external factors which are evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The assessment of the conditions and recommendations was made by the consulting engineer in accordance with generally and currently accepted engineering principles and practices.

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

NAME OF DAM: Doverspike No. 2 Dam
STATE LOCATED: Pennsylvania
COUNTY LOCATED: Jefferson
STREAM: Caylor Run, Tertiary Tributary of Mahoning Creek
SIZE CLASSIFICATION: Intermediate
HAZARD CLASSIFICATION: Significant
OWNER: J. C. Enterprises
DATE OF INSPECTION: April 24, 1980 and May 1, 1980

ASSESSMENT: Based on the evaluation of the existing conditions, the condition of Doverspike No. 2 Dam is considered to be good, except that the dam has no outlet works and no formally engineered spillway facilities. A low spot on the crest of the dam located at the junction of the embankment and the right abutment appears to be the intended spillway overflow section. On the dates of inspection, the pool level was found to be approximately 5 feet below the low spot on the crest of the dam, and as reported by the representative of the owner, the pool is normally maintained at that level by seepage and evaporation losses from the reservoir.

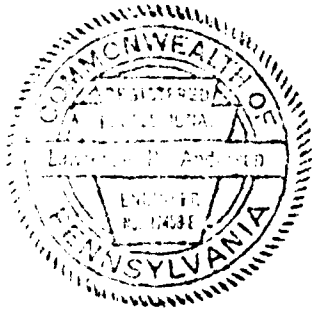
According to the recommended criteria, intermediate size dams in the significant hazard category are required to pass from 50 percent of the probable maximum flood (PMF) to full PMF. In view of the downstream damage potential, the lower limit of the recommended range is considered to be applicable to this dam. The flood discharge capacity was evaluated according to the recommended procedure and the dam was found to impound less than 20 percent of the PMF without overtopping the embankment. Therefore, the flood discharge capacity of the dam is classified to be inadequate.

The following recommendations should be implemented as soon as possible or on a continuing basis.

1. The owner should retain a professional engineer experienced in the design and construction of dams to conduct additional detailed hydrologic and hydraulic studies to more accurately ascertain the required spillway capacity and the nature and extent of improvements required to provide structurally and hydrologically adequate spillway facilities.

2. Around-the-clock surveillance should be provided during unusually heavy runoff and a formal warning system should be developed to alert the downstream residents in the event of emergencies. The owner should also develop a plan to draw down the reservoir in the event of an emergency.

3. The dam and appurtenant structures should be inspected regularly and a formal maintenance manual should be developed for the future maintenance of the dam.



Lawrence D. Andersen, P.E.
Vice President

July 30, 1980
Date

Approved by:

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

Date 27 Aug 80

DOVERSPIKE NO. 1 DAM
NDI I.D. PA-810
DER I.D. 33-57
APRIL 24, 1980

Overview

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(Continued)

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM
DOVERSPIKE NO. 2. DAM
NDI I.D. PA-810
DER I.D. 33-57

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. The inspection was performed pursuant to the authority granted by The National Dam Inspection Act, Public Law 92-367, to the Secretary of the Army, through the Corps of Engineers, to conduct inspections of dams throughout the United States.

b. Purpose. The purpose of this inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project

a. Dam and Appurtenances. Doverspike No. 2 Dam consists of an earth embankment approximately 650 feet long. The available information indicates the maximum height of the embankment to be 50 feet from the downstream toe. The downstream slope, which is approximately on a 9H to 1V, gradually merges with the downstream valley and the toe of the dam cannot be readily identified. The crest of the dam is 40 feet wide and the slope of the upstream face above normal pool level is 3H to 1V.

The reservoir has neither a low-level outlet facility nor an overflow facility to control the normal pool level. As reported by the owner's representative, the pool is normally maintained approximately 5 to 6 feet below the low point on the crest of the dam by reservoir seepage and evaporation losses.

A low spot on the crest of the dam at the junction of the embankment and right abutment appears to be the intended spillway for the reservoir. This low area on the crest of the dam is approximately triangular in cross section with a top width of about 60 feet at the dam crest level and a depth of 2 to 2-1/2 feet from the mean dam crest elevation. No defined discharge channel exists below this low spot on the crest of the dam.

b. Location. Doverspike No. 2 Dam is located on Caylor Run approximately one mile upstream from its confluence with Pine

Run, which is a secondary tributary of Mahoning Creek, about one mile north of the community of Dora in Ringgold Township, Jefferson County, Pennsylvania. Plate 1 illustrates the location of the dam.

c. Size Classification. Intermediate (based on 50-foot height and 332 acre-feet maximum storage capacity).

d. Hazard Classification. The dam is classified to be in the significant hazard category. Below the dam, the valley is approximately 400 to 500 feet wide with gentle side slopes. A small stream originates approximately 500 to 600 feet downstream from the dam. The stream flows under a railroad embankment approximately one mile downstream from the dam and then joins Pine Run, a secondary tributary of Mahoning Creek. Rural residential areas are located downstream of the railroad embankment underpass. It is estimated that failure of the dam may cause loss of a few lives and property damage in the farms in the vicinity of the confluence of Caylor Run and Pine Run.

e. Ownership. J. C. Enterprises (address: Mr. Mike McMeans, Box 90, Ringgold, Pennsylvania 15770).

f. Purpose of Dam. Recreation.

g. Design and Construction History. The dam was designed by Delta Associates from Timlen, Pennsylvania, and constructed by the original owner, Doverspike Brothers, Inc., with completion in 1975.

h. Normal Operating Procedure. As it presently exists, the dam has no overflow facilities to maintain the pool at a given elevation. As reported by the owner's representative, the pool is maintained at a level about 5 to 6 feet below the low spot on the crest of the dam by evaporation and seepage losses from the reservoir.

1.3 Pertinent Data. Elevations referred to in this and subsequent sections of the report were calculated based on field measurements assuming the pool level on the dates of inspection to be at Elevation 1400 (USGS Datum), the elevation which is shown to be the normal pool elevation on the USGS 7.5-minute Dayton quadrangle.

a. Drainage Area	0.9 square mile
b. Discharge at Dam Site (cfs)	
Maximum known flood at dam site	Unknown
Outlet conduit at maximum pool	Not applicable(1)

(1) The dam has no outlet facilities.

Gated spillway capacity at maximum pool	Not applicable
Ungated spillway capacity at maximum pool[1]	0
Total spillway capacity at maximum pool[1]	0

c. Elevation (USGS Datum) (feet)

Top of Dam	1404.7 (low spot on crest); Design crest elevation unknown
Maximum pool	1404.7
Normal pool	1400±
Upstream invert outlet works	Not applicable
Downstream invert outlet works	Not applicable
Maximum tailwater	Unknown
Toe of Dam	1355±

d. Reservoir Length (feet)

Normal pool level	3000
Maximum pool level	3100±

e. Storage (acre-feet)

Normal pool level	500±
Maximum pool level	700±

f. Reservoir Surface (acres)

Normal pool level	29
Maximum pool level	35

g. Dam

Type	Earth
Length	650 feet
Height	50 feet
Top width	40 feet
Side slopes	Downstream: 9H:1V Upstream: 3H:1V
Zoning	Unknown
Impervious core	Unknown
Cutoff	Unknown
Grout curtain	Unknown

[1] The dam has no formal spillway.

h. Regulating Outlet. The dam has no regulating facilities.

i. Spillway. The dam has no formal spillway.

SECTION 2
DESIGN DATA

2.1 Design

a. Data Available. The available data consist of files provided by the Commonwealth of Pennsylvania, Department of Environmental Resources (PennDER), which contain correspondence and a foundation investigation report.

(1) Hydrology and Hydraulics. The available information includes no data relative to the hydrology and hydraulics.

(2) Embankment. The available information includes a report entitled, Foundation Investigation for Proposed Earth Dam, Dora, Pennsylvania, prepared by Pittsburgh Testing Laboratories, dated April 6, 1973.

(3) Appurtenant Structures. The available information consists of a description of a proposed spillway for the dam included in a Commonwealth report.

b. Design Features

(1) Embankment. As described in the Pittsburgh Testing Laboratories report, the dam was designed to be a homogeneous earth embankment with a 2H to 1V downstream slope and a 1.5H to 1V upstream slope and a crest width of 20 feet. Apparently during the construction of the dam, material available from a nearby coal stripping operation was placed on the downstream face of the dam, increasing the crest of the dam to about 40 feet and reducing the downstream slope to the present 9H to 1V slope. The design provided a cutoff trench at the center line of the embankment to be excavated to top of rock and backfilled with compacted material.

(2) Appurtenant Structures. The proposed spillway structures for the dam were supposed to consist of a 40-foot-wide, concrete-paved, open channel located at the right abutment-embankment interface, discharging into a channel. Field observations indicated that these spillway structures have not been constructed.

c. Design Data

(1) Hydrology and Hydraulics. No design data are available.

(2) Embankment. As described in the Pittsburgh Testing Laboratories report, the design of the proposed dam (which was

significantly modified during construction) consisted of subsurface investigation, laboratory and materials testing, and engineering analyses, including slope stability and seepage analyses. The configuration of the embankment used for a seepage and stability analysis is shown in Plate 2. The factor of safety against slope stability failure is reported to be in the range of 1.4 to 1.5.

2.2 Construction. Available records indicate that the dam was constructed by the original owner, Doverspike Brothers, Inc. No information was found to indicate the manner in which the dam was constructed.

2.3 Operation. There are no formal operating records maintained for the dam.

2.4 Other Investigations. None reported.

2.5 Evaluation

a. Availability. The available information was provided by PennDER.

b. Adequacy

(1) Hydrology and Hydraulics. No design information is available. The dam has no outlet facilities nor a formal spillway.

(2) Embankment. The available design information was found to include subsurface investigation, laboratory testing, and engineering analysis. However, no information was found to assess the adequacy of the construction of the dam.

(3) Appurtenant Structures. No information is available on the design of the appurtenant structures.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General. The on-site inspection of Doverspike No. 2 Dam consisted of:

1. Visual inspection of the embankment, abutments, and embankment toe.

2. Evaluation of downstream area hazard potential.

The specific observations are illustrated in Plate 3.

b. Embankment. The general inspection of the embankment consisted of searching for indications of structural distress, such as cracks, subsidence, bulging, wet areas, seeps and boils, and observing general maintenance conditions, vegetative cover, erosion, and other surficial features.

In general, the condition of the embankment is considered to be good. The downstream face of the dam is covered with grass and is used as pasture. The upstream face of the dam is also covered with grass and was found to be in good condition with no signs of significant shoreline erosion.

The crest of the dam was surveyed relative to the pool elevation on the date of inspection, and the crest profile is illustrated in Plate 4. A low area found on the crest of the dam near the right abutment appears to be the intended spillway overflow section for the reservoir. The downstream and upstream slopes of the dam were surveyed and found to be approximately 9H to 1V and 3H to 1V, respectively.

c. Appurtenant Structures. The dam has no outlet works nor a formal spillway.

d. Reservoir Area. A map review and visual observations indicate that the watershed is predominantly covered by reclaimed strip-mined areas. No signs of landslide activity in the vicinity of the reservoir were found. A review of the regional geology is included in Appendix F.

e. Downstream Channel. Because there is no discharge from the dam, there is no perennial streambed below the dam for approximately 500 to 600 feet. At that point, a small stream originates and flows south. Approximately one mile downstream from the dam,

this stream flows under a railroad embankment, then shortly thereafter joins Pine Run, a secondary tributary of Mahoning Creek. A further description of the downstream conditions is included in Section 1.2d.

3.2 Evaluation. The overall condition of the embankment is considered to be good. Installation of an overflow spillway with adequate discharge capacity, erosion protection and discharge channel is considered to be required.

SECTION 4
OPERATIONAL FEATURES

4.1 Procedure. There are no formal operating procedures for the dam. As it presently exists, the reservoir is maintained at a level approximately 5 to 6 feet below the low spot on the crest of the dam (assumed spillway section) with flow balance apparently maintained by seepage and evaporation losses from the reservoir.

4.2 Maintenance of the Dam. The downstream face of the dam is covered with grass and currently is a pasture. There are no features of the dam that at this time would require maintenance.

4.3 Maintenance of Operating Facilities. The dam has no operable facilities.

4.4 Warning System. No formal warning system exists for the dam. Telephone communication facilities are available via residences approximately one mile downstream from the dam.

4.5 Evaluation. The dam has no operable facilities and no features that would require maintenance at this time. As mentioned previously, it is required that the dam be equipped with structurally and hydrologically adequate spillway facilities.

SECTION 5
HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features

a. Design Data. Doverspike No. 2 Dam has a watershed of 0.9 square mile and impounds a reservoir with a surface area of 29 acres at normal pool level. As previously mentioned, the dam is not equipped with a discharge facility that would maintain a given normal pool elevation. Apparently, the normal pool is maintained by reservoir seepage and evaporation losses balancing the inflow. The dam has no formal spillway facilities. A low spot on the crest of the dam near the right abutment appears to be the location of the intended overflow spillway.

b. Experience Data. As previously stated, Doverspike No. 2 Dam is classified as an intermediate size dam in the significant hazard category. Under the recommended criteria for evaluating emergency spillway discharge capacity, such impoundments are required to pass from 50 percent PMF to full PMF. In view of the downstream hazard potential, the lower limit of the recommended range is considered to be applicable to this dam.

The PMF inflow hydrograph for the reservoir was determined utilizing the Dam Safety Version of the HEC-1 computer program developed by the Hydrologic Engineering Center of the U.S. Army, Corps of Engineers. The data used for the computer analysis are presented in Appendix D. The one-half PMF inflow hydrograph was found to have a peak flow of 945 cfs. Computer input and summary of computer output for the PMF analysis are included in Appendix D.

c. Visual Observations. Although the low spot on the crest of the dam is not equipped with any erosion protection measures, flow through this section is not considered to pose a significant breach potential due to the wide dam crest and shallow downstream slope.

d. Overtopping Potential. Various percentages of the PMF inflow hydrograph were routed through the reservoir, and it was found that the dam can impound less than 20 percent of the PMF without overtopping the low spot on the crest (Elevation 1404.7). For 40 percent of the PMF, it was found that only the low spot on the crest of the dam near the right abutment would be overtopped, and for 50 percent of the PMF, most of the crest would be overtopped for a duration of 4.8 hours with a maximum depth of about 0.5 foot.

e. Spillway Adequacy. The dam was found to impound less than 20 percent of the PMF without overtopping the embankment, which is less than the required spillway capacity of 50 percent PMF relative to size and hazard classification of the dam. Therefore, the flood impoundment/discharge capacity is classified to be inadequate.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

(1) Embankment. As discussed in Section 3, the overall condition of the embankment was considered to be good. No conditions were observed that would raise concern relative to the overall stability of the dam at this time.

(2) Appurtenant Structures. The dam has no appurtenant structures.

b. Design and Construction Data

(1) Embankment. The visual observations indicate that the typical cross section of the embankment had been significantly modified during construction. The proposed dam, as shown in Plate 2, consisted of a homogeneous embankment with a 2H to 1V downstream slope, a 1.5H to 1V upstream slope, and a crest width of 20 feet. Presently, the downstream slope is approximately 9H to 1V and the crest is about 40 feet wide. The design of the proposed embankment consisted of subsurface investigation, laboratory and materials testing, and engineering analysis. The slope stability factor of safety of the proposed dam was reported to be in the range of 1.4 to 1.5. Based on visual observations, the static stability of the existing embankment is considered to be adequate.

(2) Appurtenant Structures. The dam has no structural appurtenant facilities.

c. Operating Records. No operating records are maintained.

d. Post-Construction Changes. None reported.

e. Seismic Stability. The dam is located in Seismic Zone 1, and based on visual observations, the static stability of the dam appears to be adequate. Therefore, based on the recommended criteria for the evaluation of seismic stability of dams, the structure is presumed to present no hazard as a result of earthquakes.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment

a. Assessment. The visual observations indicate that Doverspike No. 2 Dam is in good condition. The dam has neither an overflow facility to maintain a prescribed normal pool elevation nor a low-level outlet facility for emergency drawdown purposes. As reported by the owner's representative, the normal pool level is maintained by reservoir seepage and evaporation losses. It was found that a low area exists on the crest at the right abutment-embankment junction. However, this section is not equipped with erosion protection and downstream discharge channel to properly function as an emergency spillway section.

In view of the above conditions, it is recommended that hydrologic and hydraulic features of the dam be evaluated by an experienced professional engineer to prepare plans to provide adequate spillway facilities to maintain a prescribed normal pool elevation and to have adequate flood discharge capacity.

The flood impoundment/discharge capacity of the dam was found to be less than 20 percent of the PMF without overtopping the embankment. Because this capacity is less than the recommended flood impoundment or discharge capacity of 50 percent of the PMF, the flood impoundment/discharge capacity of the dam is classified as inadequate.

b. Adequacy of Information. Available information, in conjunction with visual observations, is considered to be sufficient to make the following recommendations.

c. Urgency. The following recommendations should be implemented immediately or on a continuing basis.

d. Necessity for Additional Data. In view of the conditions described above, the owner should retain an experienced professional engineer to prepare and implement plans to provide adequate spillway facilities.

7.2 Recommendations/Remedial Measures. It is recommended that the following recommendations be implemented immediately or on a continuing basis:

1. The owner should retain a professional engineer experienced in the design and construction of dams to conduct additional

detailed hydrologic and hydraulic studies to more accurately ascertain the required spillway capacity and the nature and extent of improvements required to provide structurally and hydrologically adequate spillway facilities.

2. Around-the-clock surveillance should be provided during unusually heavy runoff and a formal warning system should be developed to alert the downstream residents in the event of emergencies. The owner should also develop a plan to draw down the reservoir in the event of an emergency.

3. The dam and appurtenant structures should be inspected regularly and a formal maintenance manual should be developed for the future maintenance of the dam.

APPENDIX A

CHECKLIST
VISUAL INSPECTION
PHASE I

APPENDIX A

CHECKLIST
VISUAL INSPECTION
PHASE I

NAME OF DAM Doverspike No. 2 Dam COUNTY Jefferson STATE Pennsylvania ID# NDI I.D. PA-810 DER I.D. 33-57

TYPE OF DAM Earth HAZARD CATEGORY Significant

DATE(S) INSPECTION April 24, 1980 WEATHER Sunny TEMPERATURE 60s

POOL ELEVATION AT TIME OF INSPECTION 1400 M.S.L. TAILWATER AT TIME OF INSPECTION 1350 M.S.L.

INSPECTION PERSONNEL:

B. Erel

W. T. Chan

REVIEW INSPECTION PERSONNEL:
(May 1, 1980)

E. D'Appolonia

L. D. Andersen

J. H. Poellot

OWNER'S REPRESENTATIVE:

Mike McMeans

B. Erel RECORDER

VISUAL INSPECTION
PHASE I
EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	An erosion ditch exists between the right abutment-embankment interface starting at a point approximately 200 feet downstream from the crest of the dam.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	See Plate 4 for the longitudinal dam crest profile.	
RIPRAP FAILURES	The upstream slope has no erosion protection.	

VISUAL INSPECTION
PHASE I
EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No signs of distress.	
ANY NOTICEABLE SEEPAGE	None	
STAFF GAGE AND RECORDER	None	
DRAINS	None	

VISUAL INSPECTION
PHASE I
OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	(The dam has no outlet works.)	
INTAKE STRUCTURE	Not applicable	
OUTLET STRUCTURE	Not applicable	
OUTLET CHANNEL	Not applicable	
EMERGENCY GATE	Not applicable	

VISUAL INSPECTION
PHASE I
UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	A low spot on the crest of the dam near the right abutment appears to be the intended emergency overflow section for the dam.	
APPROACH CHANNEL	Lake	
DISCHARGE CHANNEL	None	
BRIDGE AND PIERS	None	

VISUAL INSPECTION
PHASE I
GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	Not applicable	
APPROACH CHANNEL	Not applicable	
DISCHARGE CHANNEL	Not applicable	
BRIDGE PIERS	Not applicable	
GATES AND OPERATION EQUIPMENT	Not applicable	

VISUAL INSPECTION
PHASE I
INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER	None	

VISUAL INSPECTION
PHASE I
RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Moderately steep to steep. No significant shoreline erosion or indications of landslides.	
SEDIMENTATION	Unknown	
UPSTREAM RESERVOIRS	None	

VISUAL INSPECTION
PHASE I
DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Because there is no discharge from the dam, there is no established downstream channel.	
SLOPES	No features pertinent to the safety of the dam.	
APPROXIMATE NUMBER OF HOMES AND POPULATION	About one mile downstream from the dam, the stream flows under a railroad embankment and immediately downstream from the railroad embankment there are two residences and several farm buildings. Population: approximately 5 to 10.	

APPENDIX B

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
AND HYDROLOGIC AND HYDRAULIC
PHASE I

APPENDIX B

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Doverspike No. 2 Dam

ID# NDI I.D. PA-810
DER I.D. 33-57

ITEM	REMARKS
AS-BUILT DRAWINGS	Not available
REGIONAL VICINITY MAP	See Plate 1.
CONSTRUCTION HISTORY	The dam was constructed by the original owner, Doverspike Brothers, Inc., with completion in 1975.
TYPICAL SECTIONS OF DAM	See Plate 2.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	The dam has no outlet works.

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	Not maintained
DESIGN REPORTS	Foundation Investigation for Proposed Earth Dam, Dora, Pennsylvania, by Pittsburgh Testing Laboratories, dated April 6, 1973.
GEOLOGY REPORTS	Same as above.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Included in the above-referenced design report.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Included in the above-referenced design report.

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

ITEM	REMARKS
POST CONSTRUCTION SURVEYS OF DAM	None reported
BORROW SOURCES	Unknown
MONITORING SYSTEMS	None
MODIFICATIONS	None reported
HIGH POOL RECORDS	Not recorded

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

ITEM	REMARKS
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None reported
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None reported
MAINTENANCE OPERATION RECORDS	Not maintained
SPILLWAY PLAN SECTIONS DETAILS	Not available
OPERATING EQUIPMENT PLANS AND DETAILS	The dam has no operating equipment.

CHECKLIST
ENGINEERING DATA
HYDROLOGIC AND HYDRAULIC

DRAINAGE AREA CHARACTERISTICS: 0.9 square mile (reclaimed strip-mined area)

ELEVATION, TOP OF NORMAL POOL AND STORAGE CAPACITY: 1400 (500 acre-feet)

ELEVATION, TOP OF FLOOD CONTROL POOL AND STORAGE CAPACITY: 1404.7 (700± acre-feet)

ELEVATION, MAXIMUM DESIGN POOL: 1404.7

ELEVATION, TOP OF DAM: 1407.5 (measured low spot); design elevation unknown

SPILLWAY:

a. Elevation 1404.7

b. Type Earth open channel

c. Width (approximately triangular in cross section)

d. Length 60 feet

e. Location Spillover Adjacent to spillway

f. Number and Type of Gates None

OUTLET WORKS:

a. Type (The dam has no outlet works)

b. Location Not applicable

c. Entrance Inverts Not applicable

d. Exit Inverts Not applicable

e. Emergency Drawdown Facilities None

HYDROMETEOROLOGICAL GAGES:

a. Type None

b. Location None

c. Records None

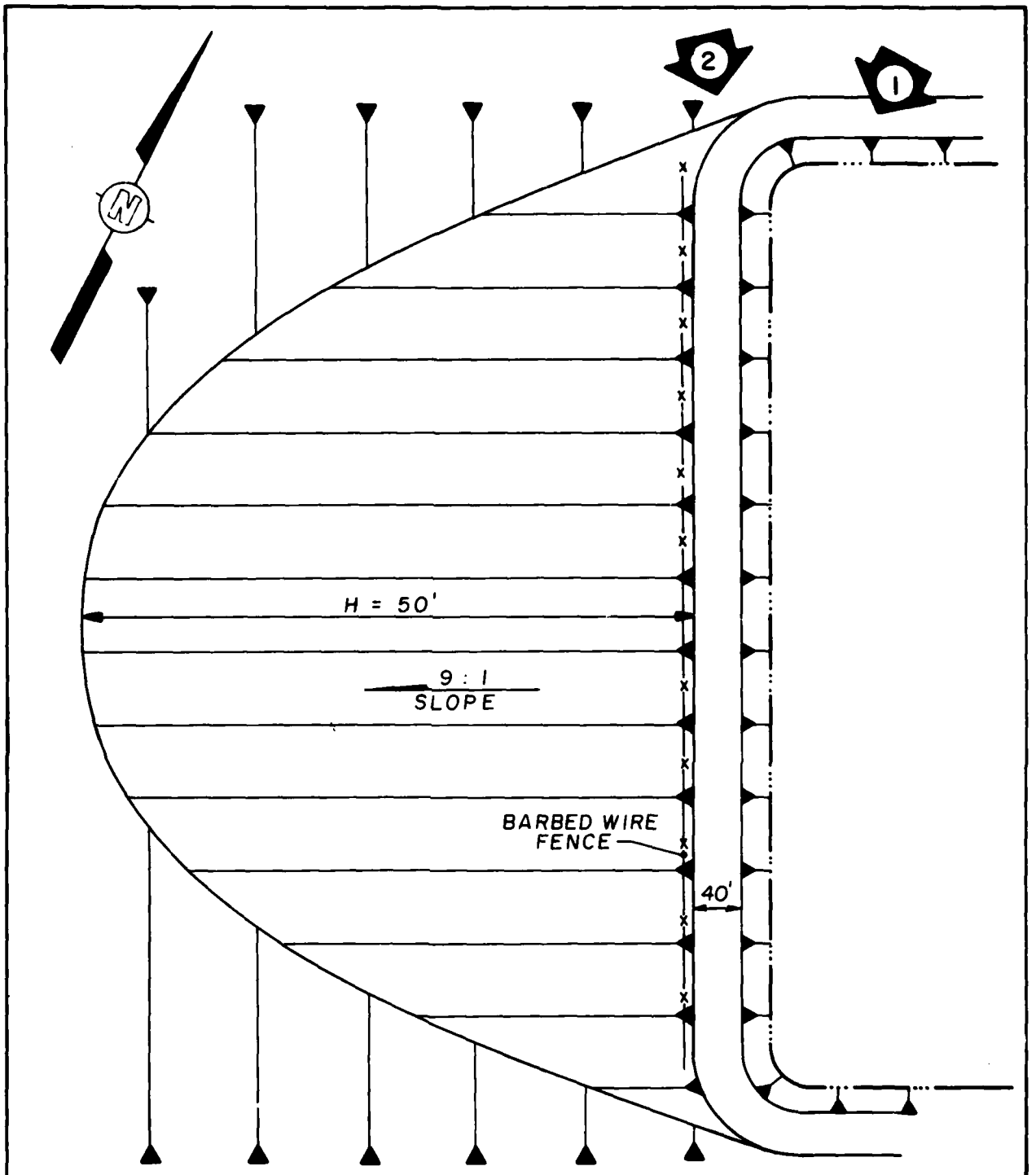
MAXIMUM NONDAMAGING DISCHARGE: cfs (flow over the low section on the crest of the dam)

APPENDIX C

PHOTOGRAPHS

LIST OF PHOTOGRAPHS
DOVERSPIKE NO. 2 DAM
NDI I.D. PA-810
DER I.D. 33-57
APRIL 24, 1980

PHOTOGRAPH NO.	DESCRIPTION
1	Upstream face (looking south).
2	Crest (looking southeast). Foreground: low area on crest, possible emergency spillway.
3	A culvert under railroad embankment (approximately one mile downstream).
4	Farms immediately downstream from railroad embankment.



LEGEND:

2 INDICATES DIRECTION IN WHICH PHOTOGRAPH WAS TAKEN

DOVERSPIKE No. 2 DAM
KEY PLAN OF PHOTOGRAPHS
FIELD INSPECTION DATE: APR. 24, 1980

D'APPOLONIA

Photograph No. 1

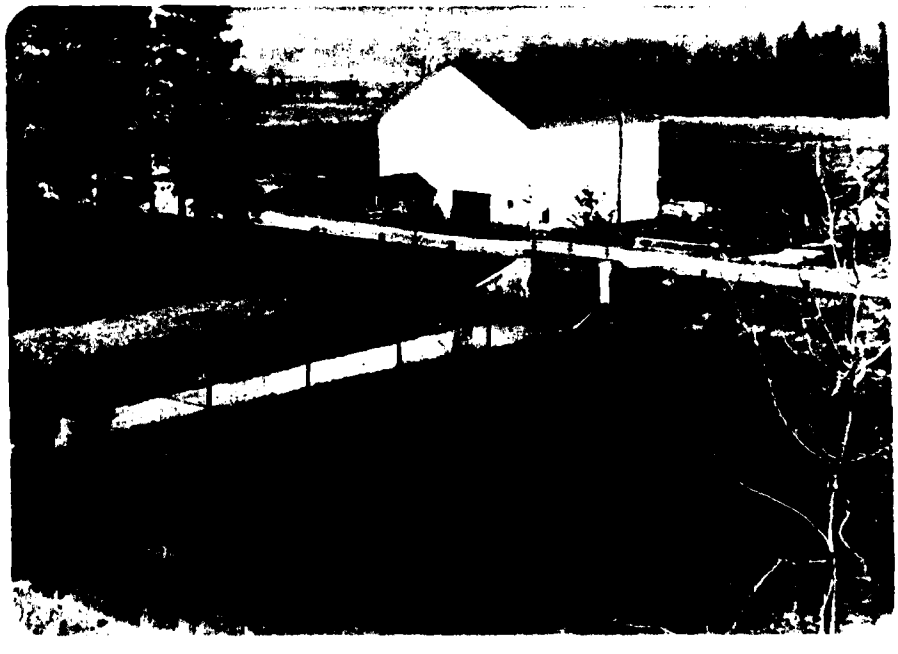
Upstream face (looking south).

Photograph No. 2

Crest (looking southeast). Foreground: low area on crest, possible emergency spillway.

Photograph No. 3

A culvert under railroad embankment (approximately one mile downstream).



Photograph No. 4

Farms immediately downstream from railroad embankment.

APPENDIX D

HYDROLOGY AND HYDRAULICS ANALYSES

HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: Doverspike No. 2 Dam (NDI I.D. PA-810)

PROBABLE MAXIMUM PRECIPITATION (PMP) = 23.5 INCHES/24 HOURS[1]

STATION	1	2	3	4	5
Station Description	Lake	Dam			
Drainage Area (square miles)	0.9	-			
Cumulative Drainage Area (square miles)	0.9	0.9			
Adjustment of PMP for Drainage Area (%)[2]	(ZONE 7)				
6 Hours	102	-			
12 Hours	120	-			
24 Hours	130	-			
48 Hours	140	-			
72 Hours	-	-			
Snyder Hydrograph Parameters					
Zone[3]	24	-			
C_p/C_t[4]	0.45/1.6	-			
L (miles)[5]	1.8	-			
L_{ca} (miles)[5]	0.8	-			
$t_p = C_t(L \cdot L_{ca})^{0.3}$ (hours)	1.8	-			
Spillway Data					
Crest Length (ft)	-	See spillway discharge rating calculation			
Freeboard (ft)	-				
Discharge Coefficient	-				
Exponent	-				

(1) Hydrometeorological Report 33 (Figure 1), U.S. Army, Corps of Engineers, 1956.

(2) Hydrometeorological Report 33 (Figure 2), U.S. Army, Corps of Engineers, 1956.

(3) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).

(4) Snyder's Coefficients.

(5) L = Length of longest water course from outlet to basin divide.
L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

STORAGE VS. ELEVATION

ELEVATION	ΔH, FEET	AREA (ACRES)[1]	ΔVOLUME (ACRE-FEET)[2]	STORAGE (ACRE-FEET)
1400.0	20	43.2	1033.1	0
1420.0		60.6		1033.1

(1) Planimetered from USGS maps.

(2) $\Delta Volume = \Delta H/3\ (A_1 + A_2 + \sqrt{A_1 A_2})$.

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION   04 APR 80
**********
    1                 A1       SNYDER UNIT HYDROGRAPH,FLOOD ROUTING AND DAM OVERTOPPING ANALYSES
    2                 A2       DOVERSPIKE NO. 2 DAM,JEFFERSON COUNTY,NDI-ID.PA.810 PROJECT NO.79-543-23
    3                 A3       FOR 10%,15%,20%,30%,50%,60%,70%,90%, AND 100% PMF
    4                 B     300        0       15        0        0        0        0        0       -4        0
    5                 B1      5
    6                 J       1        9        1
    7                 J1   0.10     0.15     0.20     0.30     0.50     0.60     0.70     0.90     1.00
    8                 K       0        1                                          1
    9                 K1       CALCULATION OF SNYDER INFLOW HYDROGRAPH TO DOVERSPIKE NO.2 DAM
   10                 M       1        1      0.9                0.9                                      1
   11                 P                23.5      102      120      130      140
   12                 T                                                            1.0      .05           0.0735
   13                 J     1.8     0.45
   14                 X    -1.0    -0.05      2.0                                          1
   15                 K       1        2
   16                 K1       ROUTING FLOW THROUGH DOVERSPIKE NO.2 DAM (NDI-I.D.PA.810)
   17                 Y                                        1        1
   18                 Y1      1                                                  -1400.0
   19                 SA   43.2     60.6
   20                 SE1400.0  1420.0
   21                 SS1404.7     0.31     2.65      1.5
   22                 SD1404.7     2.65      1.5    650.0
   23                 SL   10.0     30.8    155.0    255.0    330.0    430.0    460.0    568.0    650.0
   24                 SV1404.7  1406.0   1407.2   1407.5   1407.6   1407.7   1407.8   1409.3   1411.4
   25                 K      99
```

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .10	RATIO 2 .15	RATIO 3 .20	RATIO 4 .30	RATIO 5 .50	RATIO 6 .60	RATIO 7 .70	RATIO 8 .90	RATIO 9 1.00
HYDROGRAPH AT	1	.90	1	189.	283.	378.	567.	945.	1134.	1323.	1700.	1889.
	(	2.33)	(	5.35)(	8.03)(	10.70)(	16.05)(	26.75)(	32.10)(	37.45)(	48.15)(	53.50)
ROUTED TO	2	.90	1	0.	0.	7.	122.	625.	916.	1183.	1642.	1846.
	(	2.33)	(	0.00)(	0.00)(	.19)(	3.46)(	17.70)(	25.95)(	33.49)(	46.48)(	52.27)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

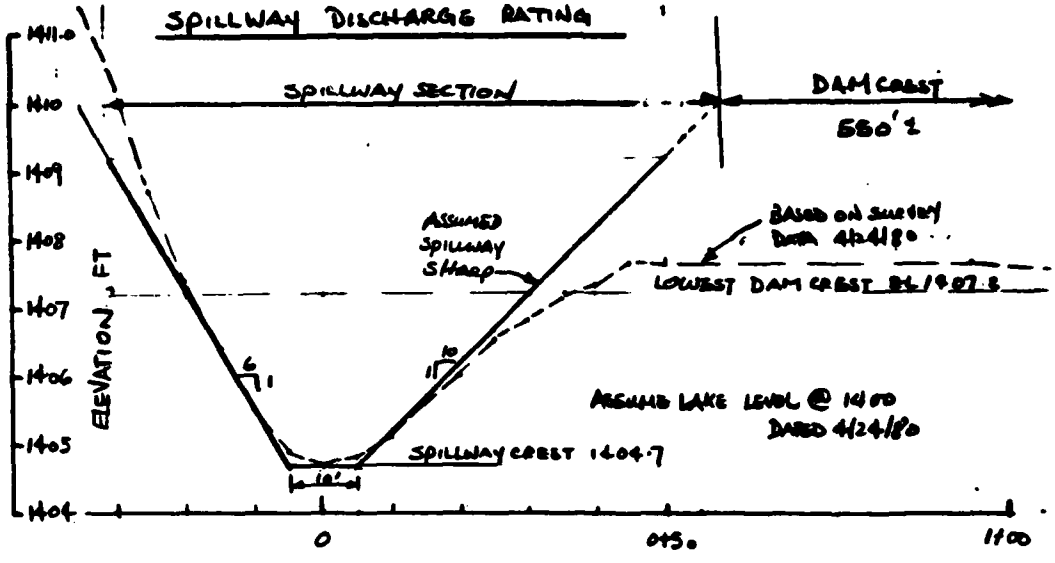
	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1400.00	1404.70	1404.70
STORAGE	0.	212.	212.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	1402.62	0.00	116.	0.	0.00	0.00	0.00
.15	1403.98	0.00	174.	0.	0.00	0.00	0.00
.20	1405.32	.32	227.	7.	27.25	55.75	0.00
.30	1406.27	1.57	287.	122.	32.25	47.50	0.00
.50	1407.42	2.72	343.	625.	34.25	43.75	0.00
.60	1407.70	3.00	357.	916.	34.75	43.25	0.00
.70	1407.88	3.18	366.	1183.	35.25	42.75	0.00
.90	1408.12	3.42	378.	1642.	36.00	42.00	0.00
1.00	1408.21	3.51	382.	1846.	36.50	42.00	0.00

OVERTOPPING ANALYSIS SUMMARY

D'APPOLONIA
CONSULTING ENGINEERS, INC.

By WTC Date 7/9/80 Subject DEVERSPIKE No. 2 DAM Sheet No. 1 of
Chkd. By EPZ Date 7/9/80 SPILLWAY Proj. No. 79-543-23



AT CONTROL SECTION CRITICAL FLOW IS DETERMINED BY

$$\frac{Q_c^2}{g} = \frac{a^3}{T}$$ P. 553 of DESIGN of SMALL DAM 2nd EDITION.

Where T = Top Width, ft
$= 10' + (d_c)(E_1 + E_2)$
$= 10' + 16(d_c)$

a = CROSS SECTION AREA
$= \left[\frac{T+10}{2}\right](d_c)$
$= [10 + 8\,d_c](d_c)$

$g = 32.2$ ft/sec^2

Q_c = DISCHARGE RATE, cfs

d_c = CRITICAL DEPTH

D'APPOLONIA
CONSULTING ENGINEERS, INC.

By WTC Date 7/9/80 Subject DOVERSPIKE No 2 DAM Sheet No. 2 of ____
Chkd. By CRL Date 7/9/80 Proj. No. 79-543-83

and $V_c = \frac{Q_c}{a}$ = CRITICAL VELOCITY, fps

RESERVOIR WATER RISE = $\Delta H = d_c + \frac{V_c^2}{2g}$, FT

LAKE LEVEL ELEVATION = 1404.7 + ΔH.

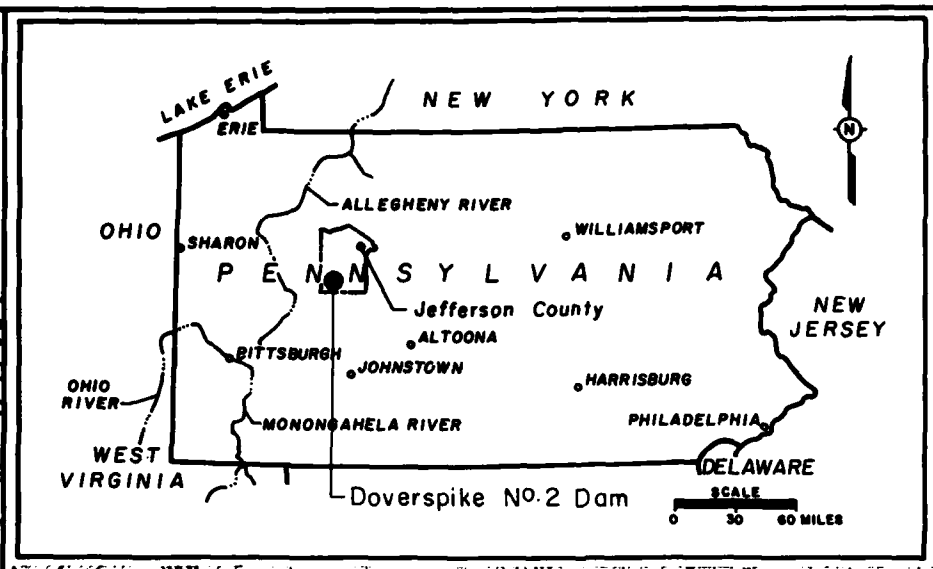
d_c	T	a	Q_c	V_c	$\frac{V_c^2}{2g}$	ΔH	LAKE ELEVATION
FT	FT	FT^2	cfs	fps	ft	FT	USGS
0	10	—	—	—	—	—	1404.7
0.5	18	7	24.8	3.5	0.2	0.7	1405.4
1.0	26	18	85.0	4.7	0.3	1.3	1406.0
1.5	84	33	184.5	5.6	0.5	2.0	1406.7
2.0	42	52	328.3	6.3	0.6	2.6	1407.3
2.5	50	75	521.2	6.9	0.8	3.3	1408.0
3.0	58	102	767.6	7.5	0.9	3.9	1408.6
3.5	66	133	1071.4	8.1	1.0	4.5	1409.2
4.0	74	168	1436.4	8.6	1.1	5.1	1409.8
6.0	106	348	3578.0	10.3	1.6	7.6	1412.3
8.0	138	592	6957.8	11.8	2.1	10.1	1414.8
10.0	170	900	11750.8	13.1	2.6	12.6	1417.3
12.1	203.6	1292.3	18474.6	14.3	3.2	15.3	1420.0

APPENDIX E

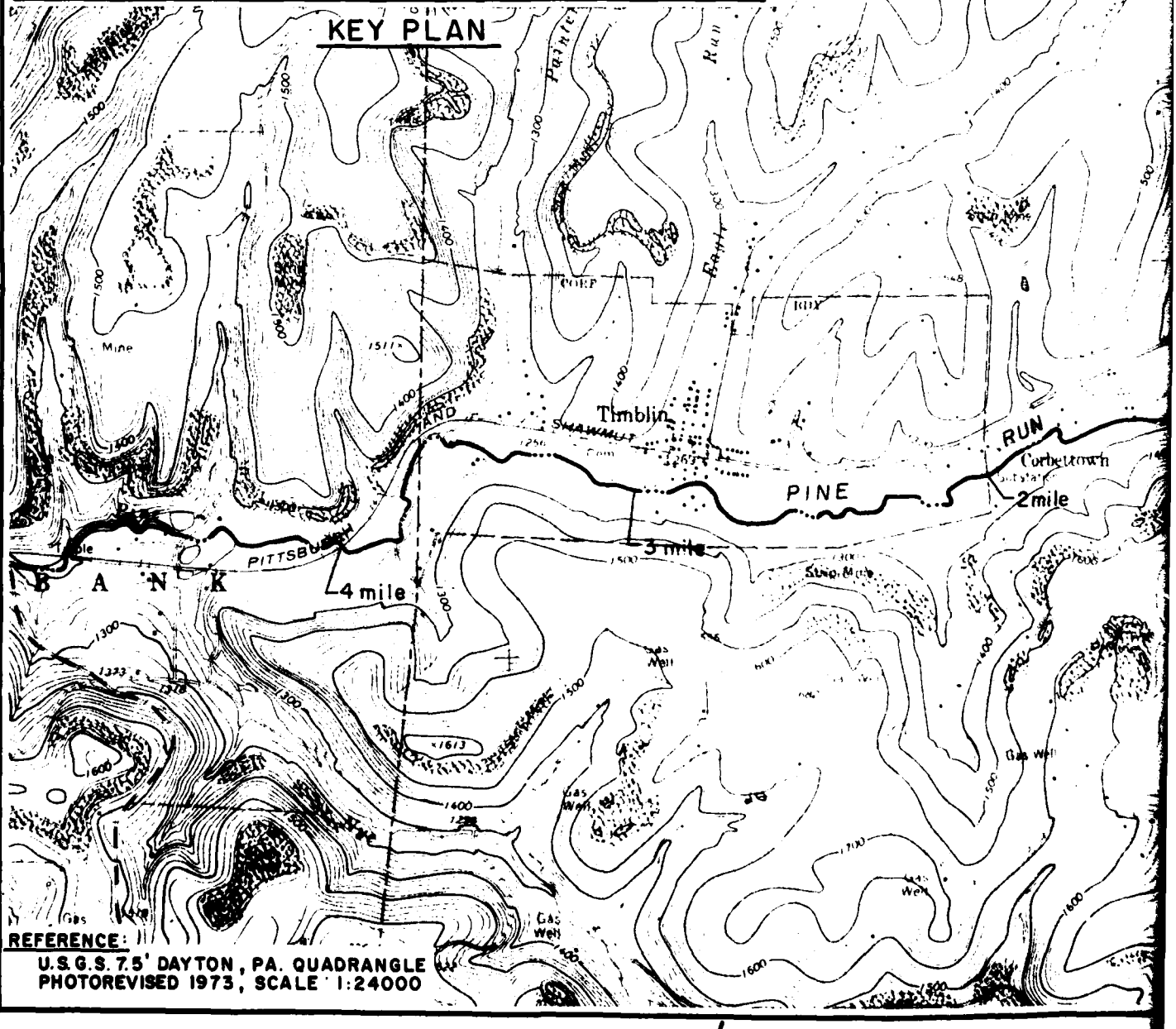
PLATES

DRAWN BY	ACS	CHECKED BY	
	11-15-79	APPROVED BY	

DRAWING NUMBER 79-543-877



KEY PLAN



REFERENCE:
U.S.G.S. 7.5' DAYTON, PA. QUADRANGLE
PHOTOREVISED 1973, SCALE 1:24000

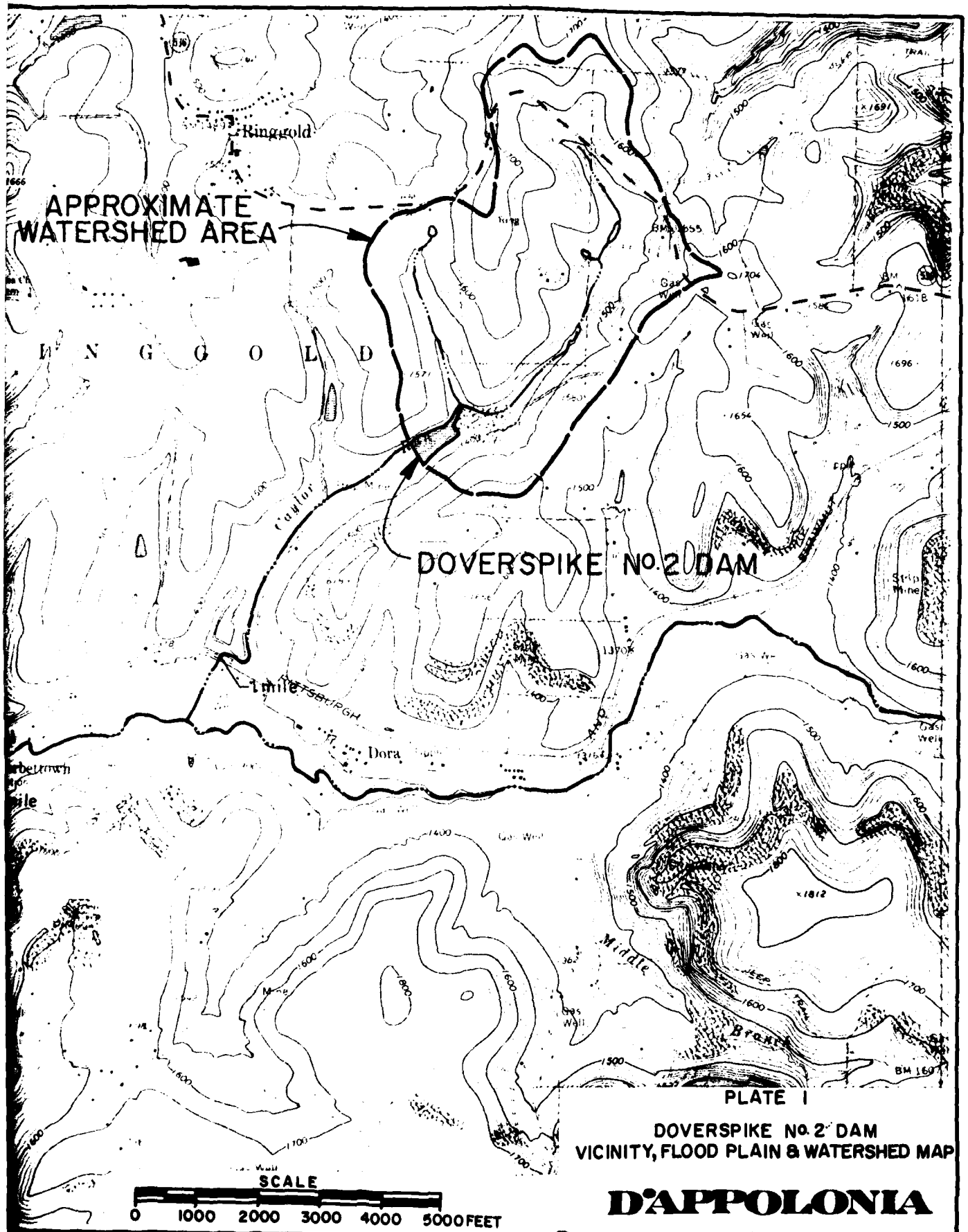
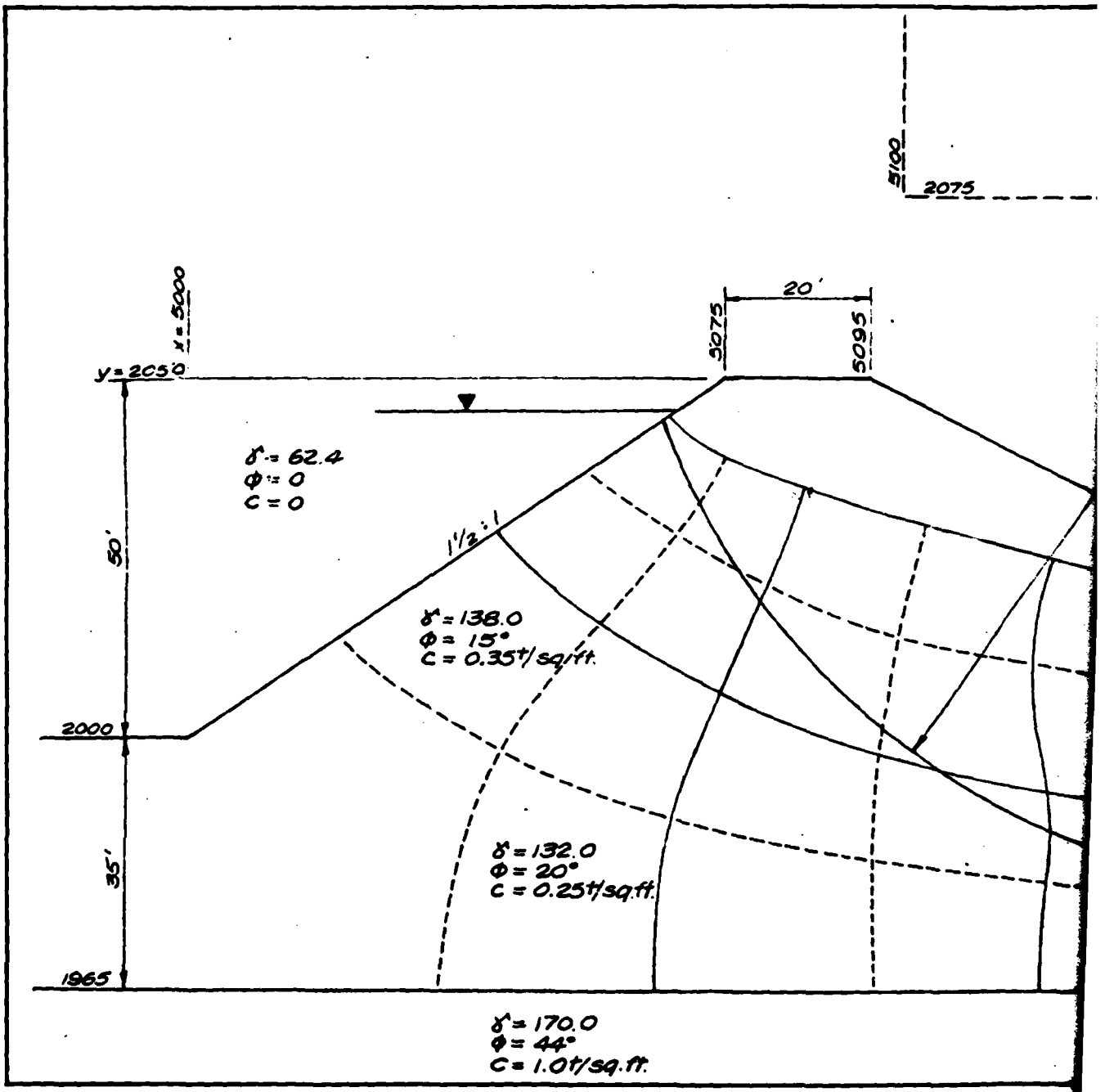


PLATE 1

DOVERSPIKE No. 2 DAM
VICINITY, FLOOD PLAIN & WATERSHED MAP

D'APPOLONIA

DRAWN BY	mcl	CHECKED BY	BG	P-14-8	DRAWING NUMBER 79-543-B78
	6-11-80	APPROVED BY	[illegible]	7.14	



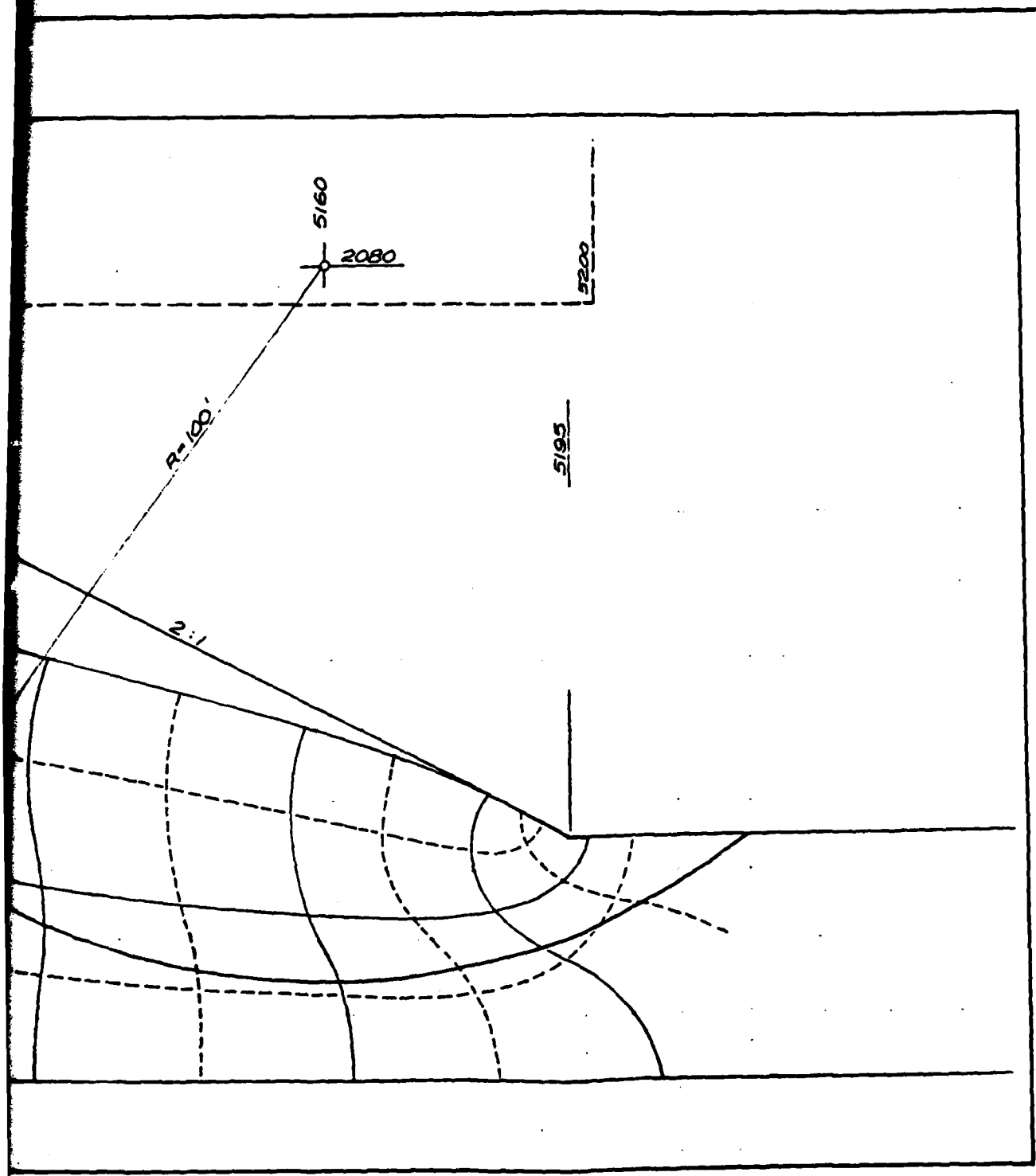
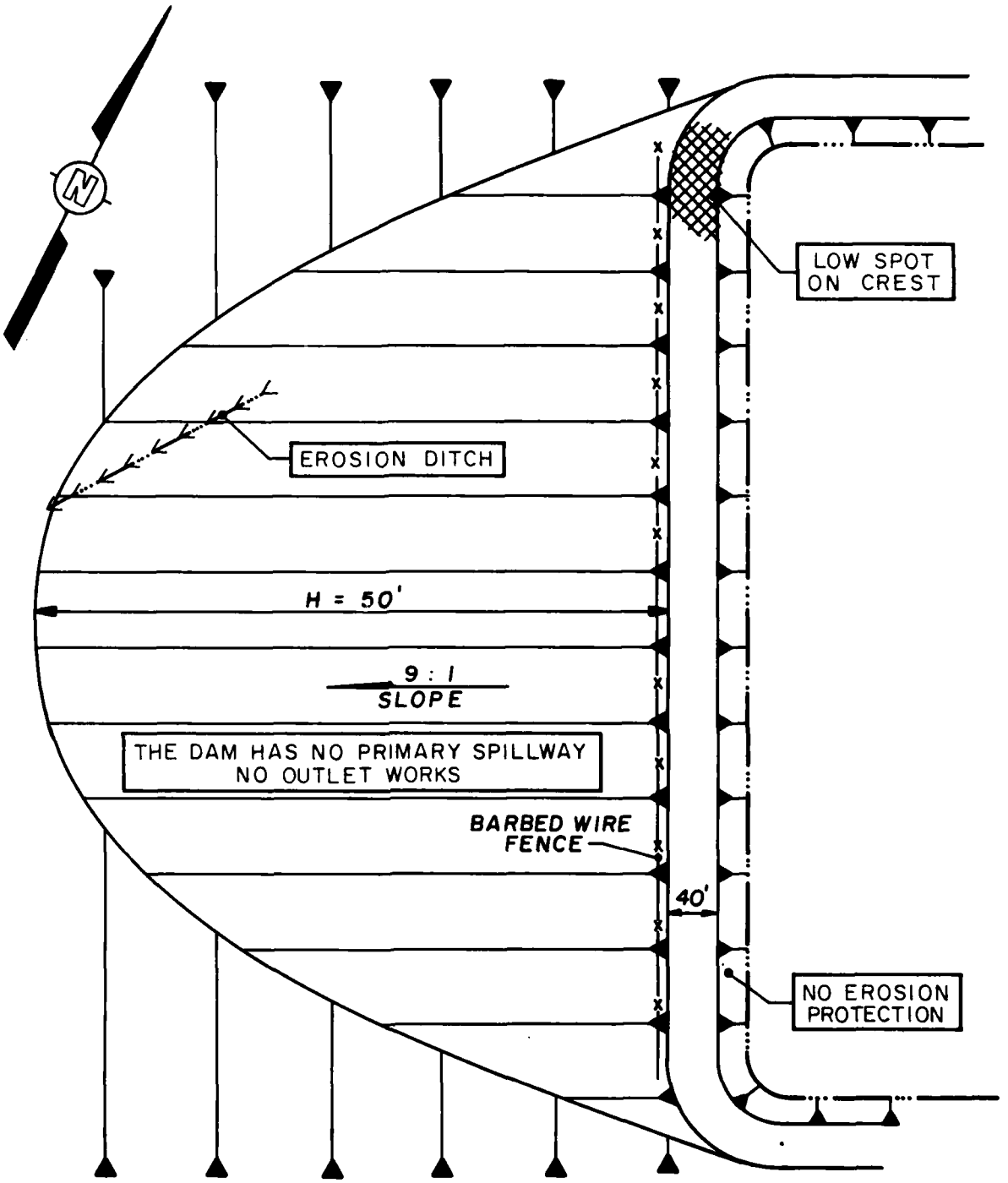


PLATE 2

D'APPOLONIA

DRAWN BY	ACS	CHECKED BY	BC	2-4-83
	7-11-80	APPROVED BY	[illegible]	7-14-80

DRAWING NUMBER 79-[illegible]3-A51



NOTES:

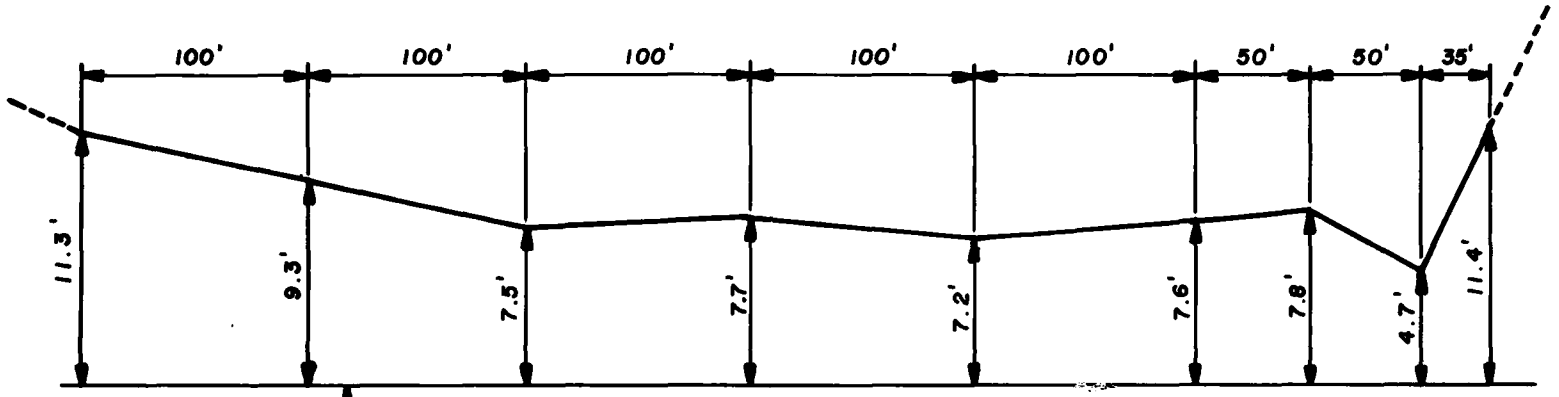
1. POOL LEVEL DATE OF INSPECTION: ≈5 FT. BELOW LOW SPOT ON CREST.

PLATE 3

DOVERSPIKE No2 DAM
GENERAL PLAN
FIELD INSPECTION NOTES
FIELD INSPECTION DATE: APR. 24, 1980

D'APPOLONIA

DRAWN BY	SH	CHECKED BY	BE	7-14-80	DRAWING NUMBER 79-3-A52
	7-10-80	APPROVED BY	[illegible]	7-14-80	



DATUM : POOL LEVEL DATE OF INSPECTION
(EL. APPROX. 1400 USGS DATUM)

DAM CREST PROFILE

(LOOKING DOWNSTREAM)

NOTES:

1. DAM CREST IS SURVEYED RELATIVE TO SPILLWAY CREST LEVEL
2. DATUM ELEVATION IS INTERPOLATED FROM USGS MAPS IS THEREFORE APPROXIMATE

PLATE 4

DOVERSPIKE No. 2 DAM
DAM CREST SURVEY
FIELD INSPECTION DATE: APR. 24, 1980

DAPPOLONIA

APPENDIX F

REGIONAL GEOLOGY

APPENDIX F

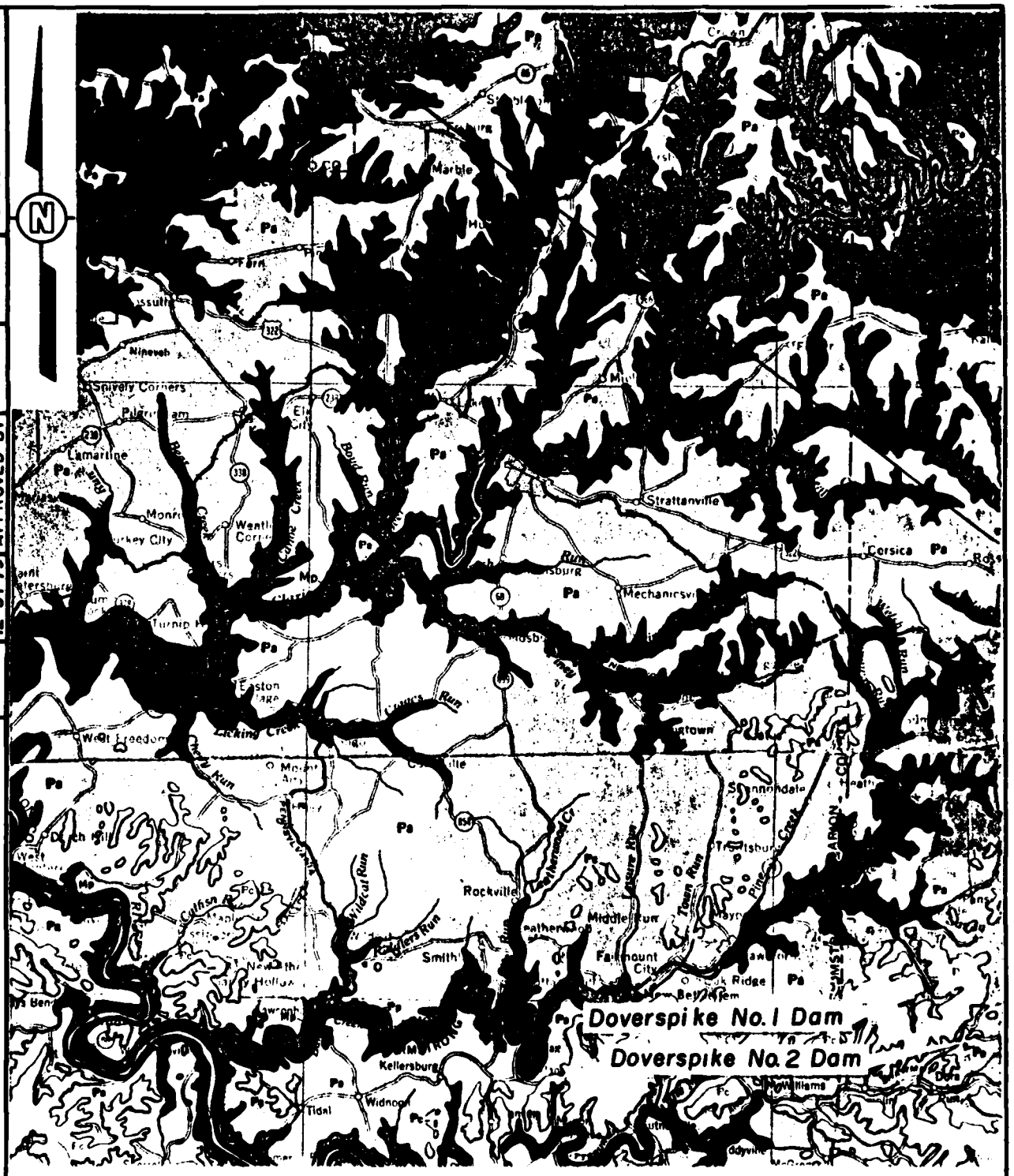
REGIONAL GEOLOGY
DOVERSPIKE NO. 2 DAM

Doverspike No. 2 Dam is located in the central section of the Appalachian Plateau Province which is characterized by broad, nearly level ridges and deep steep valleys. The dam lies near the contact of the Allegheny and Conemaugh groups of Pennsylvanian Age. Strata have been gently folded and form a broad shallow basin known as the Leechburg syncline which trends to the northeast.

The Allegheny Group is composed of shales and sandstones and several minable coals. The Upper Freeport Coal lies at the top of the Allegheny, thus delineating the Allegheny from the overlying Conemaugh Group. The Conemaugh Group is characterized by variegated shales and thick sequences of coarse-grained sandstones. The lower half of the Conemaugh, below the Ames Limestone, contains numerous claystones that are prone to landslides.

The Upper Freeport Coal has been stripped along the valley slopes in the area. No deep mines are known to exist in the area. Local stripping of the Lower Freeport Coal may also have taken place.

It should be noted that borings drilled along the north and south abutments of the dam showed a loss of drilling water, indicating highly fractured rock. This could be a problem for excessive seepage and piping. It is not known if grouting was done along the center line and abutments to control seepage.



DRAWN BY	ACS	CHECKED BY		DRAWING NUMBER 79-543-A16
	12-31-79	APPROVED BY		

N

SCALE

0 2 4 6 8 10miles

REFERENCE:
GEOLOGIC MAP OF PENNSYLVANIA PREPARED BY COMMONWEALTH OF PENNA., DEPT. OF INTERNAL AFFAIRS, DATED 1960, SCALE 1" = 4 MILES

DOVERSPIKE NO. 1 AND NO. 2 DAMS

GEOLOGY MAP

D'APPOLONIA

DRAWN BY	ACS	CHECKED BY		DRAWING NUMBER 7y-543-A18
	12-31-79	APPROVED BY		

LEGEND:

Pc

Conemaugh Formation

Cyclic sequences of red and gray shales and siltstones with thin limestones and coals; massive Mahoning Sandstone commonly present at base; Ames Limestone present in middle of section; Brush Creek Limestone in lower part of section.

Pottsville Group

Light gray to white, coarse grained sandstones and conglomerates with some minable coal; includes Sharp Mountain, Schuylkill, and Tumbling Run Formations.

Pa

Allegheny Group

Cyclic sequences of sandstone, shale, limestone and coal, numerous commercial coals, limestones thicken westward; Vanport Limestone in lower part of section, includes Freeport, Kittanning, and Clarion Formations.

Clinton Group

Predominantly Rose Hill Formation - Reddish purple to greenish gray, thin to medium bedded, fossiliferous shale with intertonguing "iron sandstones" and local gray, fossiliferous limestone; above the Rose Hill is brown to white quartzitic sandstone (Keefer) interbedded upward with dark gray shale (Rochester).

Dm

Marine beds

Gray to olive brown shales, graywackes, and sandstones, contains "Chemung" beds and "Portage" beds including Burket, Brallier, Harrell, and Trimmers Rock; Tully Limestone at base.

Pocono Group

Predominantly gray, hard, massive, cross-bedded conglomerate and sandstone with some shale, includes in the Appalachian Plateau Burgoon, Shenango, Cuyahoga, Cussewago, Corry, and Knapp Formations, includes part of "Oswayo" of M. L. Fuller in Potter and Tioga counties.

Do

Oriskany Formation

White to brown, fine to coarse grained, partly calcareous, locally conglomeratic, fossiliferous sandstone (Ridgley) at the top, dark gray, cherty limestone with some interbedded shales and sandstones below (Shriver).

Tuscarora Formation

White to gray, medium to thick bedded, fine grained, quartzitic sandstone, conglomeratic in part.

Marcellus Formation

Black, fissile, carbonaceous shale with thick, brown sandstone (Turkey Ridge) in parts of central Pennsylvania.

Onondaga Formation

Greenish blue, thin bedded shale and dark blue to black, medium bedded limestone with shale predominant in most places, includes Selinsgrove Limestone and Needmore Shale in central Pennsylvania and Buttermilk Falls Limestone and Esopus Shale in easternmost Pennsylvania, in Lehigh Gap area includes Palmerton Sandstone and Bowmanstown Chert.

Dmo

Wills Creek Formation

Greenish gray, thin bedded, fissile shale with local limestone and sandstone zones; contains red shale and siltstone in the lower part.

Bloomsburg Formation

Red, thin and thick bedded shale and siltstone with local units of sandstone and thin impure limestone, some green shale in places.

McKenzie Formation

Greenish gray, thin bedded shale interbedded with gray, thin bedded, fossiliferous limestone; shale predominant at the base, intraformational breccia in the lower part. Absent in Harrisburg quadrangle and to the east.

Keyser Formation

Dark gray, highly fossiliferous, thick bedded, crystalline to nodular limestone, passes into Manlius, Rondout, and Decker Formations in the east.

Tonoloway Formation

Gray, highly laminated, thin bedded, argillaceous limestone; passes into Bossardsville and Poxono Island beds in the east.

Dck

Catskill Formation

Chiefly red to brownish shales and sandstones, includes gray and greenish sandstone tongues named Elk Mountain, Honesdale, Shohola, and Delaware River in the east.

REFERENCE:

GEOLOGIC MAP OF PENNSYLVANIA PREPARED BY COMMONWEALTH OF PENNA. DEPT. OF INTERNAL AFFAIRS, DATED 1960, SCALE 1" = 4 MILES

GEOLOGY MAP LEGEND

D'APPOLONIA